

## CLAIMS

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is as follows:

- 1        1. An electronically controlled pneumatic (ECP) end of train (EOT)  
 2        pneumatic emulation system, comprising:  
 3                a locomotive control unit associated with a non-ECP equipped lead  
 4        locomotive; and  
 5                an interface unit providing ECP data to the locomotive control unit  
 6        received from ECP equipped train cars via data communication links,  
 7        wherein the locomotive control unit provides brake commands to the ECP  
 8        equipped train cars via the interface unit in response to the ECP data  
 9        received from the interface unit.
  
- 1        2. The system of claim 1, wherein the interface unit further provides EOT  
 2        data to the locomotive control unit in response to information received  
 3        from an EOT unit mounted on a last car of the train.
  
- 1        3. The system of claim 2, wherein the locomotive control unit provides  
 2        communication with the interface unit via a wireless data link and the  
 3        interface unit provides communication with the ECP equipped trains and  
 4        the EOT unit via an ECP trainline.
  
- 1        4. The system of claim 1, wherein the interface unit is an ECP/head of train  
 2        (HOT) interface unit which emulates a Head End Unit (HEU) in order to  
 3        provide system set-up and status reporting.
  
- 1        5. The system of claim 1, wherein the ECP equipped train cars respond to  
 2        the brake commands over an ECP trainline as initiated from the interface

3 unit, wherein the ECP equipped train cars apply and release brakes in  
4 response to changes in brake pipe pressure when there is a failure to receive  
5 the ECP message, and wherein brake operation are provided under  
6 pneumatics control during ECP failure.

1 6. The system of claim 1, wherein the interface unit supports direct release  
2 and graduated release braking applications such that in the graduated  
3 release application the interface unit sends ECP commands to release brake  
4 pipe pressure in steps to the ECP equipped trains as brake pipe pressure is  
5 restored.

1 7. The system of claim 1, wherein the locomotive control unit is a portable  
2 unit having receiver and display functions used for ECP related text  
3 messages.

1 8. The system of claim 1, wherein the interface unit provides a migration  
2 path for application between the ECP equipped train cars and non-ECP  
3 equipped train cars such that the ECP equipped train cars are provided with  
4 brake commands electrically from the interface unit via the locomotive  
5 control unit and the non-equipped train cars respond to changes in brake  
6 pipe pressure.

1 9. An electronically controlled pneumatic (ECP) end of train (EOT)  
2 pneumatic emulation system, comprising:  
3 a locomotive control unit associated with a non-ECP equipped lead  
4 locomotive; and  
5 means for interfacing ECP data to the locomotive control unit  
6 received from ECP equipped train cars, wherein the locomotive control unit  
7 provides brake commands to the ECP equipped train cars via the interface  
8 unit in response to the ECP data received from the interface unit.

1 10. The system of claim 9, wherein said means for interfacing supports both  
2 direct and graduated release braking applications such that in the graduated  
3 release application the interface unit sends ECP commands to release brake  
4 pipe pressure in steps to the ECP equipped trains as brake pipe pressure is  
5 restored.

1 11. A method of electronically controlling a brake pipe pressure in a train  
2 having an electronically controlled pneumatic (ECP) end of train (EOT)  
3 pneumatic emulation system, comprising the steps of:

4 providing a start brake pipe pressure;  
5 determining whether a rate of change of the start brake pipe  
6 pressure is within a predetermined threshold limit;  
7 providing an ECP message to the EOT and individual train cars  
8 to make a service brake application when the determining step determines  
9 that the rate of change of the start brake pipe pressure is within the  
10 threshold limit.

1 12. The method of claim 11, further comprising providing an ECP message  
2 to the EOT and individual train cars to make an emergency brake  
3 application when the determining step determines that the rate of change of  
4 the start brake pipe pressure exceeds the threshold limit.

1 13. The method of claim 12, further comprising:  
2 monitoring an emergency brake pressure at a head of train (HOT)  
3 associated with the EOT; and  
4 monitoring the emergency brake pressure at the EOT,  
5 wherein the emergency brake pressure provides the emergency  
6 brake application.

- 1 14. The method of claim 13, further comprising:  
2 determining when the emergency brake pipe pressure measured by  
3 the EOT exceeds a first predetermined limit;  
4 determining when the emergency brake pipe pressure measured by  
5 the HOT exceeds a second predetermined limit,  
6 wherein the emergency brake pipe application remains active when  
7 the EOT determining step and the HOT determining step are below the  
8 predetermined limit and the second predetermined limit, respectively.
- 1 15. The method of claim 14, wherein the first predetermined limit is  
2 approximately 70 PSI and the second predetermined limit is approximately  
3 15 PSI plus the first predetermined limit.
- 1 16. The method of claim 14, further comprising increasing the brake pipe  
2 pressure to the start brake pipe pressure when the EOT determining step  
3 and the HOT determining step exceed the predetermined limit and the  
4 second predetermined limit, respectively.
- 1 17. The method of claim 11, further comprising providing an ECP message  
2 to the EOT and individual train cars to make an emergency brake pressure  
3 application when the service brake application exceeds a predetermined  
4 reduction in brake pipe pressure.
- 1 18. The method of claim 17, wherein the predetermined reduction in brake  
2 pipe pressure is approximately 120% of a full service brake application.
- 1 19. The method of claim 11, further comprising determining whether there  
2 is a change in the start brake pipe pressure prior to the determining whether  
3 a rate of change of the start brake pipe pressure is within the predetermined  
4 threshold limit, wherein a second ECP message is provided to the EOT and

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